XML & Web Services With PHP

An Overview

Ben Ramsey
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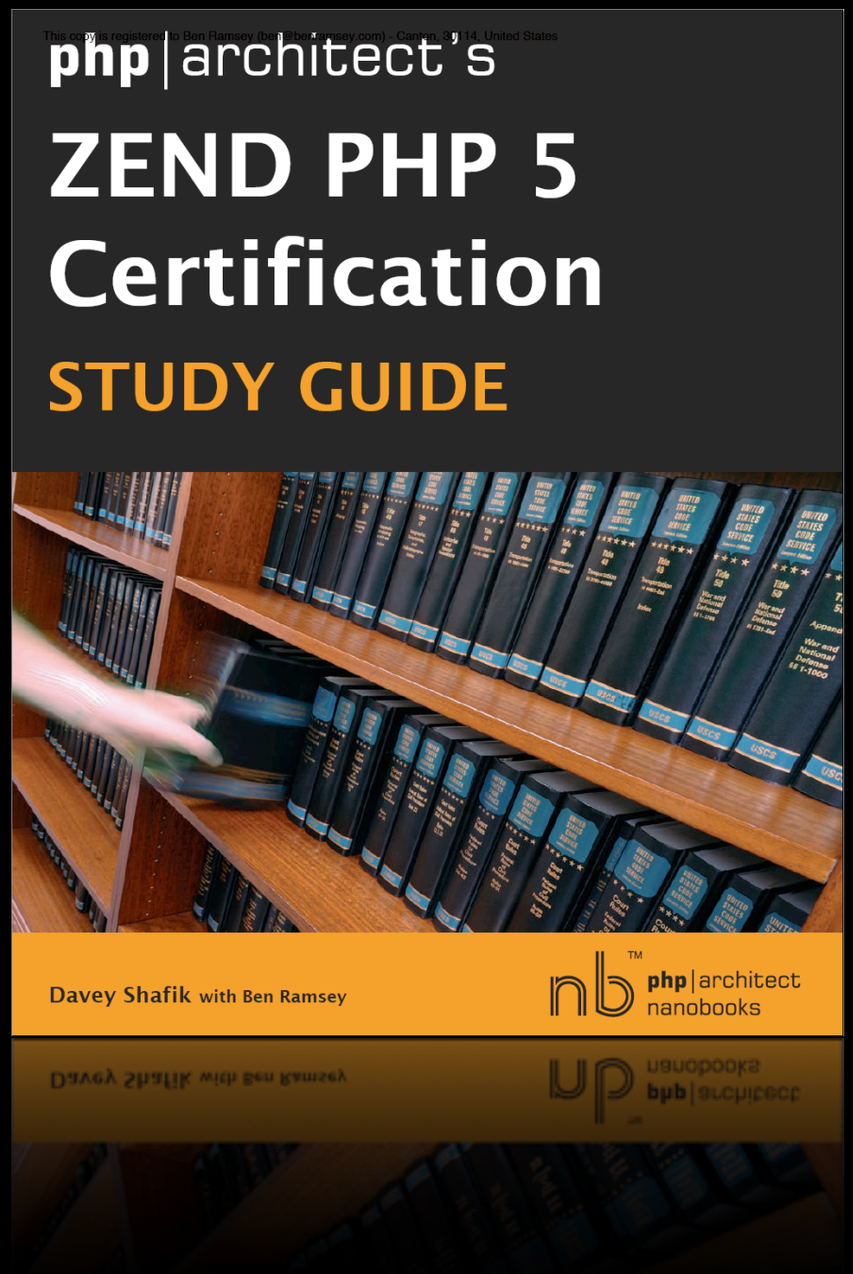
Welcome

- BenRamsey.com
- I work for Art & Logic, Inc.
- PHP 5 Certification Study Guide author
- Fart around on #phpc



Web Services

What is a Web Service?

- Public interface (API)
- Provides access to data and/or procedures
- On a remote/external system (usually)
- Often uses XML for data exchange

Why XML?

- Extensible Mark-up Language
- Flexible mark-up language
- Lightweight and easy to parse
- Communication between disparate systems

Types of Web Services

- XML-RPC
- SOAP
- REST

XML-RPC

What Is XML-RPC?

- XML Remote Procedure Call
- Specification maintained at xmlrpc.com (but no DTD, XSD, etc.)
- Provides a means to call methods/ procedures on a remote server and make changes and/or retrieve data
- POST with XML request body and receive an XML response body

Using XML-RPC

- Most common implementation of XML-RPC used today is that of blog ping services
- Technorati, Flickr, others?
- Use PEAR::XML_RPC to access and create XML-RPC services
- SOAP is its successor

SOAP

What Is SOAP?

- Previously an acronym for Simple Object Access Protocol
- Version 1.2 of the W3C recommendation dropped the acronym
- SOAP is not simple!
- Specification maintained at w3.org

What Is SOAP?

- Provides a mechanism for various messaging patterns
- All messages sent in a SOAP envelope that is an XML wrapper for data read and generated by the SOAP server
- Most common message pattern is the Remote Procedure Call (RPC) pattern

SOAP In Short

- SOAP provides a means to interact with a remote system by sending it commands and getting a response
- It is the natural successor of XML-RPC

Using SOAP

- Send a message specifying an action to take, including data for the action
- Receive a return value from the action
- Most SOAP services provide a WSDL file to describe the actions provided by the service

WSDL

- Web Services Description Language
- XML mark-up for describing the functionality provided by a SOAP service

```xml
<?xml version="1.0"?>
<definitions name="GoogleSearch"
             targetNamespace="urn:GoogleSearch"
             xmlns:typens="urn:GoogleSearch"
             xmlns:xsd="http://www.w3.org/2001/XMLSchema"
             xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
             xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
             xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
             xmlns="http://schemas.xmlsoap.org/wsdl/">

  <message name="doGoogleSearch">
    <part name="key"            type="xsd:string"/>
    <part name="q"              type="xsd:string"/>
    <part name="start"          type="xsd:int"/>
    <part name="maxResults"     type="xsd:int"/>
    <part name="filter"         type="xsd:boolean"/>
    <part name="restrict"       type="xsd:string"/>
    <part name="safeSearch"     type="xsd:boolean"/>
    <part name="lr"             type="xsd:string"/>
    <part name="ie"             type="xsd:string"/>
    <part name="oe"             type="xsd:string"/>
  </message>

  <service name="GoogleSearchService">
    <port name="GoogleSearchPort" binding="typens:GoogleSearchBinding">
      <soap:address location="http://api.google.com/search/beta2"/>
    </port>
  </service>

</definitions>
```

PHP 5 Makes It Easy to Access a SOAP Service

Example: Google SOAP Search API

```php
<?php

try
{
  $client = new SoapClient('http://api.google.com/GoogleSearch.wsdl');
  $results = $client->doGoogleSearch($key, $query, 0, 10,
      FALSE, '', FALSE, '', '', '');
  foreach ($results->resultElements as $result)
  {
    echo '<a href="' .
    echo htmlentities($result->URL, ENT_COMPAT, 'UTF-8');
    echo '">';
    echo htmlentities($result->title, ENT_COMPAT, 'UTF-8');
    echo '</a><br/>';
  }
}
catch (SoapFault $e)
{
  echo $e->getMessage();
}

?>
```

Providing a Service

- Create a class that contains public methods for the SOAP server to use
  - This is the service you want to provide
- Instantiate a SoapServer object using the class
- Optionally create and provide a WSDL file (PHP 5 does not do this for you)

```php
<?php

class MySoapServer
{
  public function getMessage()
  {
    return 'Hello, World!';
  }

  public function addNumbers($num1, $num2)
  {
    return $num1 + $num2;
  }
}

$options = array('uri' => 'http://example.org/soap/server/');
$server = new SoapServer(NULL, $options);
$server->setClass('MySoapServer');
$server->handle();

?>
```

```php
<?php

$options = array(
  'location' => 'http://example.org/soap/server/server.php',
  'uri'      => 'http://example.org/soap/server/'
);
$client = new SoapClient(NULL, $options);

$message  = $client->getMessage();
$addition = $client->addNumbers(3, 5);

?>
```

REST

What is REST?

- Representational State Transfer
- Term originated in 2000 in Roy Felding's doctoral dissertation about the Web entitled "Architectural Styles and the Design of Network-based Software Architectures"

Theory of REST

- Focus on diversity of resources (nouns), not actions (verbs)
- Every resource is uniquely addressable
- All resources share the same constrained interface for transfer of state (actions)
- Must be stateless, cacheable, and layered

Web As Prime Example

- URIs uniquely address resources
- HTTP methods (GET, POST, HEAD, etc.) and content types provide a constrained interface
- All transactions are atomic
- HTTP provides cache control

Relaxing REST

- Any simple interface using XML over HTTP (in response to GET requests)
- That is also not RPC-based
- May use JSON, YAML, plain text, etc. instead of XML
- In most PHP applications, this is what we mean when we say "REST"

Consuming a Service

- Send a GET request:

```
http://search.yahooapis.com/WebSearchService/V1/
webSearch?appid=ramsey&query=PHP
```

- Parse the response (with SimpleXML if receiving XML)

```php
<?php

$query = 'PHP';

$request  = 'http://search.yahooapis.com/';
$request .= 'WebSearchService/V1/webSearch?';
$request .= 'appid=ramsey&query=' . urlencode($query);

$ResultSet = new SimpleXMLElement($request, NULL, TRUE);

foreach ($ResultSet as $Result)
{
    echo '<p><a href="';
    echo htmlentities($Result->Url);
    echo '">';
    echo htmlentities($Result->Title, ENT_COMPAT, 'UTF-8');
    echo '</a><br/>';
    echo htmlentities($Result->Summary, ENT_COMPAT, 'UTF-8');
    echo '</p>';
}

?>
```

Providing a Service

- No specific REST service library; the design is up to you
- Keep URLs simple and easy to understand
- Each URL (combined with its querystring params) must uniquely identify the resource it requests
- Return XML, JSON, YAML, etc.
- Use a library for generating these formats

Consuming Web Services

Why Use Web Services?

- Access to content/data stores you could not otherwise provide (zip codes, news, pictures, reviews, etc.)
- Enhance site with a service that is not feasible for you to provide (maps, search, products, etc.)
- Combine these services into a seamless service you provide (mash-ups)

What Services Are Available?

- Google
- Yahoo!
- Amazon
- eBay
- Flickr
- del.icio.us
- etc.

Security Concerns

- Regardless of the provider, do not trust the validity of the data; it is tainted
  - Filter all incoming data
- Authentication schemes (HTTP Auth, tokens, etc.)

Providing Web Services

Why Provide a Service?

- You have a service that benefits your users best if they can get to their data from outside the application
- You want others to use your data store in their applications
- All the cool kids are doing it

Which Service Is Right?

- REST provides a unique resource identifier for all data in the system
- SOAP does not but provides a means to send/receive remote procedure calls
- Many services provide multiple APIs
- Matter of preference

Security Concerns

- A Web Service accepts data from remote applications/machines
  - Filter all input
- Output as XML, JSON, etc.
  - Escape output accordingly
- For authentication and sensitive data, force the use of SSL

Summary

Further Reading

- See my Web site for slides and links:
  benramsey.com/archives/zendcon06-talk